AVIATION COMBINED ARMS TACTICAL TRAINER

AND THE

AVIATION RECONFIGURABLE MANNED SIMULATOR

(AVCATT-A)

OPERATIONAL REQUIREMENTS DOCUMENT

12 Apr 1999 REVISION
Approved 3 May 99

CARD NUMBER 05029

1. **GENERAL DESCRIPTION OF OPERATIONAL CAPABILITY**. The Aviation Combined Arms Tactical Trainer-Aviation Reconfigurable Manned Simulator (AVCATT-A) system is a dynamic, alternative instructional concept to train and rehearse, through networked simulation, in a collective and combined arms simulated battlefield environment. The AVCATT-A system is a critical element of the Combined Arms Training Strategy (CATS). It supports institutional, organizational, and sustainment training for Active Component (AC) and Reserve Component (RC) aviation units worldwide. Collective and combined arms simulation exercises will provide commanders with an affordable capability to train supporting individual tasks required to conduct unit collective training and rehearsals, the unit's mission essential task list (METL), and combined arms wartime mission performance requirements. The AVCATT-A system will interoperate with other simulation systems through local area network (LAN) and wide area network (WAN) utilizing broadcast and multicast modes, will be Joint Technical Architecture-Army (JTA-A) compliant, will be Synthetic Environment (SE) Core compliant, and will achieve fair fight interoperability with the Close Combat Tactical Trainer (CCTT) as the threshold and other SE Core compliant systems as the objective. The AVCATT-A system will provide a fair fight, realistic, high intensity, task-loaded combat environment composed of attack, reconnaissance, cargo, and utility aircraft platforms, semi-automated forces (SAF) workstations, after action review (AAR) capability, a battlemaster control (BMC) console, and workstations for ground maneuver, fire support (FS), close air support (CAS), logistics, battle command, and engineer role players.

2. **THREAT**. Not applicable.

3. **SHORTCOMINGS OF EXISTING SYSTEMS**. The existing aviation simulation training capability does not fully support the aviation CATS. Current training media and the environments in which they are employed do not provide the realism, intensity, and integration required to prepare aviation to operate effectively on the joint/combined arms battlefield. Existing simulation is limited primarily to individual/crew trainers, which do not reflect the latest aircraft configuration and are not designed for interoperable collective/combined arms exercises. Field training exercises are increasingly constrained by high cost, environmental and safety restrictions, limited maneuver areas and ranges, and inadequate threat/target representations. Neither existing simulations nor field training exercises are capable of realistically simulating the joint/combined arms battlefield, providing effective joint task force/combined arms training, or supporting mission rehearsal in a joint/combined arms environment. Due to the increasing constraints on live gunnery training, simulation must be used to work through primary and secondary weapon systems training deficiencies on utility and attack aircraft.

4. **CAPABILITIES REQUIRED**. The AVCATT-A system provides a needed aviation collective training capability. Through interoperability and networking with CCTT, the AVCATT-A system will provide aviation the opportunity to

conduct realistic collective and combined arms training and mission rehearsals with other Army battlefield operating system (BOS) training systems. In the capabilities required subparagraphs below, requirements will be identified as key performance parameters (KPP) or objective requirements. All unmarked requirements are threshold requirements.

a. **System Performance**. The AVCATT-A system must be of sufficient functional and physical fidelity to enable collective and combined arms training in day, aided and unaided night, and adverse weather environments **(KPP)**. The switches, indicators, instruments, and controls necessary to perform the required collective tasks in Table 1 below must be fully simulated. Individual tasks must be supported, to the extent necessary, to perform the required collective tasks. Provisions must be made for functional and physical fidelity to carry through for the life of the design basis aircraft. All changes to aircraft systems that impact training must be incorporated into the AVCATT-A system in a timely manner in order to maintain configuration with fielded aircraft. The AVCATT-A system must be capable of simultaneously conducting an after action review (AAR) of a previously executed training exercise while a training exercise is being executed in the aircraft training devices.

RATIONALE: AVCATT-A must have the appropriate levels of functionality and fidelity and environmental training capabilities to ensure effective collective and combined arms training and the capability to perform all necessary collective tasks and supporting individual tasks. Timely aircraft system updates to aircraft training devices are required to ensure effective training and to avoid negative training transfer. The capability to conduct an AAR and a training exercise simultaneously is required to support multiple unit training requirements and ensure maximum utilization and training effectiveness of the AVCATT-A system.

TABLE 1
AVCATT-A COLLECTIVE TASK LIST

Task Number	Task Statement	Attack	Cavalry	Cargo/ Utility
1-2-C001	Conduct a Fratricide Risk Assessment and Apply Appropriate Risk Reduction Measures to the Operational Plan	X	X	X
1-2-0005	Perform Command and Control Mission Support			X
1-2-0101	Move to and Occupy Assembly Area	X	X	X
1-2-0103	Detect and React to Opposing Forces (OPFOR)	X	X	X
1-2-0105	Engage Targets	X	X	
1-2-0106	Conduct Joint Air Attack Team (JAAT) Operations	X	X	
1-2-0107	Conduct Hasty Air Combat Operations	X	X	X

TABLE 1 (cont) AVCATT-A COLLECTIVE TASK LIST				
Task Number	**Task Statement**	**Attack**	**Cavalry**	**Cargo/ Utility**
1-2-0108	Conduct Downed Aircrew Recovery Operations	X	X	X
1-2-0109	Establish Aerial Radio Relay			X
1-2-0206	Perform Target Designation for Precision Munitions	X	X	
1-2-0207	Perform Target Acquisition and Designation	X	X	
1-2-0208	Perform Target Acquisition Missions	X	X	
1-2-0210	Conduct Rear Area Surveillance and Reconnaissance	X	X	X
1-2-0211	Conduct Deliberate Attack	X	X	
1-2-0401	Use Passive and Active Air Defense Measures (Also Task Numbers 1-2-2051 and 1-2-2052)	X	X	X
1-2-0402	Take Active Air Defense Measures Against Hostile Aircraft	X	X	X
1-2-0403	Comply with Established Army Airspace Command and Control (A2C2) Measures	X	X	X
1-2-0501	Return to Assembly Area and Prepare for Future Operations	X	X	X
1-2-0502	Report Intelligence Data	X	X	X
1-2-0603	Conduct a Radiological Survey	X	X	X
1-2-0613	Conduct a Chemical Survey	X	X	X
1-2-1301	Conduct Mission Planning	X	X	X
1-2-2017	Perform Internal Load Operations			X
1-2-2033	Use Countermeasures to Ensure Aircraft Survivability	X	X	X
1-2-2037	Conduct Holding Area Operations	X	X	X
1-2-2038	Conduct Support by Fire (SBF)/Attack by Fire (ABF) Operations	X	X	
1-2-2040	Conduct Engagement Area Operations	X	X	
1-2-2041	Conduct a Screen	X	X	
1-2-2042	Conduct Operations as Part of Guard Force	X	X	X
1-2-2043	Conduct Operations as Part of Covering Force	X	X	X
1-2-2044	Conduct Battle Handover/Relief on Station	X	X	

TABLE 1 (cont) AVCATT-A COLLECTIVE TASK LIST				
Task Number	**Task Statement**	**Attack**	**Cavalry**	**Cargo/ Utility**
1-2-2103	Move from a Combat Position	X	X	
1-2-2104	Conduct a Tactical Air Movement as Part of a Movement to Contact or Air Assault Security Operations	X	X	X
1-2-5102	Prepare for Air Movement Operations	X	X	X
1-2-5103	Conduct Air Movement Operations	X	X	X
1-2-5104	Prepare for Air Assault Operations	X	X	X
1-2-5105	Conduct Air Assault Operations	X	X	X
1-2-5106	Conduct Air Movement of Nuclear Weapons			X
1-2-6101	Conduct Area Reconnaissance	X	X	X
1-2-6102	Conduct Zone Reconnaissance	X	X	X
1-2-6103	Conduct Route Reconnaissance	X	X	X
1-2-6104	Perform Actions on Contact	X	X	X
1-2-6106	Conduct Screening Operations	X	X	
1-2-6107	Conduct Hasty Attack	X	X	
1-2-6108	Conduct Air Assault Security	X	X	
1-2-6109	Conduct Movement to Contact	X	X	
1-2-7105	Perform Passage of Lines	X	X	X
1-2-7106	Receive and Analyze Mission to Provide Aviation Support	X	X	X
1-2-7108	Conduct Movement of Personnel			X
1-2-7110	Conduct Slingload Operations			X
1-2-7113	Conduct Search and Rescue Operations	X	X	X
1-2-7304	Plan Crash Rescue Mission			X
1-2-7503	Perform Risk Management Procedures	X	X	X
1-2-7701	Conduct an Aerial Medical Evacuation			X
1-2-7707	Evacuate Casualties			X
1-2-7733	Conduct Aerial Resupply			X
*TBD	Conduct Deep Operations	X	X	X
**TBD	Conduct Suppression of Enemy ADA	X	X	

*Use Task Number 1-2-0211 Deliberate Attack as a reference for this task.
**Use Task Number 1-2-2033 Use Countermeasures to Ensure Aircraft Survivability as a reference for this task.

(1) **Aircraft Training Devices**. The AVCATT-A system must be capable of providing unit collective training utilizing reconfigurable aircraft training devices **(KPP)**. Each aircraft training device must be reconfigurable to the AH-1F Cobra,

AH-64A Apache, AH-64D Longbow Apache, RAH-66 Comanche, OH-58D Improved (I)/Improved Optimized (IO)/Digitized (R), UH-60A/L/X Blackhawk, UH-1H Iroquois, CH-47D Chinook, CH-47D Improved Cargo Helicopter (ICH), and Light Utility Helicopter (LUH) aircraft. Threshold configurations are AH-64D Longbow, AH-64A, OH-58D(I), UH-60A/L, CH-47D, AH-1F, and UH-1H. Objective configurations for the RAH-66 include an early objective configuration (first version) slated for delivery in September 2002 and a final objective configuration (2nd version) based on the final design of the Comanche. The early objective version will include sufficient configuration components to populate one AVCATT-A suite. Additional objective configurations are OH-58D(IO/R), UH-60X, CH-47D ICH, and LUH. There must be six aircraft training devices to portray attack company, cavalry/reconnaissance troop, assault company, and cargo platoon configurations (75 percent unit aircraft availability). The aircraft training devices must provide internal and external sensory stimuli to the required fidelity to allow crews to shoot, move, and communicate and have the physical and functional characteristics necessary to support realistic training of the required collective tasks listed in Table 1. Specific characteristic requirements are:

(a) **Flight Characteristics**. The flight characteristics of each respective aircraft type must be provided with sufficient fidelity to support the collective tasks in Table 1 and preclude the learning of incorrect skills in the control of the aircraft. The flight characteristics must realistically reflect environmental effects such as temperature and wind. Performance must be realistically affected and limited by altitude and temperature and accurately reflected on cockpit instruments.

(b) **Flight Controls**. The flight control system will be modeled including crew station hardware (flight controls/components), mechanical and electronic functional characteristics, and stabilator operations. Crew station hardware will provide static and dynamic feel that represents the design basis aircraft in range and rate of movement, force gradients, and moment breakouts. The mechanical crew station linkage of the flight controls will be simulated and must provide realistic fidelity and control feel for the design basis aircraft.

(c) **System Performance**. The characteristics and functionality of each aircraft subsystem (engine(s), transmission, hydraulic, landing gear, rotor/drive, auxiliary power unit (APU), fuel, instruments, controls, displays, operational flight programs, system processors, display processors, weapon processors, and electrical systems) must be simulated in the aircraft training devices. Sounds associated with each system will be provided in the appropriate quadrant relative to the crew station. Limited system failures and appropriate cockpit indications must be provided to the extent necessary to perform the required collective tasks in Table 1. Cockpit indications must include vibration cues as appropriate.

(d) **Sensors**. Appropriate sensors to include Forward Looking Infrared (FLIR), Pilot Night Vision System (PNVS), Image Intensification (I2), low level light television, Target Acquisition System (TAS), Night Vision Goggle (NVG) with Optical Display Assembly (ODA) and Heads Up Display (HUD) (AN/AVS7), and Longbow millimeter wave radar must replicate the capabilities and characteristics appropriate to the design basis aircraft. The crew must be capable of detecting, classifying, recognizing, and identifying targets at the respective sensor's maximum effective range. Sensor detection must consider the target size and range, the target radar cross section (RCS) and/or infrared (IR) signature, the aspect angle, and the effects of clutter and propagation loss. Sensor displays must correlate with the visual scene. Sensor performance must be capable of being impacted by prevailing atmospheric conditions such as temperature gradients, smoke, and fog. Cockpit sensor displays must have resolution at least equivalent to the design basis aircraft sensor displays. The AVCATT-A system must include the capability to simulate the Fire Control Radar (FCR) Navigation and Terrain Profile Modes. The Integrated Helmet and Display Sight System (IHADSS), Helmet Integrated Display Sight System (HIDSS), and NVG with ODA and AN/AVS7 must be simulated to the required fidelity to enable pilots and copilot/gunners to fly nap-of-the-earth (NOE) or conduct multi-ship operations.

1. The aircraft training devices will model the IHADSS/HIDSS/ NVG with ODA and AN/AVS7 to simulate the operation of the design basis aircraft. All control features and displays will be provided. The fidelity and operation of the display system will be the same as the design basis aircraft. The aircraft training devices will simulate the full characteristics of headtracking. Aircrew personal helmets will be utilized (objective).

2. **Target Acquisition Systems**. The aircraft training devices will model the operation and control of the target acquisition systems per the design basis aircraft. The Target Acquisition Designation Sight (TADS) to FCR link will be modeled. The aircraft training devices will simulate Laser Range Finder/Designator (LRF/D) operational characteristics including spot jitter, beam divergence, attenuation, backscatter, overspill, and underspill. The capability will exist to laser range and/or designate any feature within the database. Image autotracker operation will allow the aircrew to track contrast within the database. Image autotracker operational characteristics will include tracker polarity and breaklock. Remote laser designation will be provided.

3. **Fire Control Radar (FCR)**. The aircraft training devices will provide the capability to select configuration either with or without an FCR installed. When the aircraft training device is configured with the FCR, the following performance characteristics will be provided. Operational modes will include Ground Targeting Mode (GTM), Radar Map (RMAP), Air Targeting Mode (ATM), and Terrain Profiles Mode (TPM) per the design basis aircraft. All operational control and crew station symbology will be provided per the design

basis aircraft. Radar performance, displays, and operating characteristics will be simulated. FCR operational features will include an unclassified model for the following:

- terrain, targets and cultural objects correlated with the out-the-window (OTW) and sensor imagery.
- reflectivity, aspect effects, shadows, and directivity.
- characteristics including:
  occulting of terrain, cultural objects, and targets;
  precipitation effects;
  bispectral and multi-spectral smoke;
  false targets;
  jamming effects.

4. **Night Vision Systems**. The operation, control, and display of the night vision systems will be the same as the design basis aircraft. The systems will support NOE flight.

(e) **Weapon Systems**. The weapons characteristics of the AVCATT-A system will emulate the design basis aircraft in order to prevent negative habit transfer. Weapons fly-out must be based on ballistic computations to determine impact locations to include fire-and-forget missiles. Crew station controls and functions associated with the armament system will function per the design basis aircraft including simulated jettison operations. All weapon configurations and all modes of operation possible on the design basis aircraft will be simulated.

(f) **Communications**. Voice and digital communication systems in the aircraft training devices must simulate all communication systems of the design basis aircraft and their linkages to other systems on the battlefield. The simulation will include two-way clear and secure voice, digital data, and anti-jamming operations. Aural tones and cues associated with communication subsystem operation (i.e., HAVEQUICK time of day tone KY, tones, and squelch) will be provided. Transceiver capabilities will include interaction with the simulated real world environment to include line of sight considerations and electro-magnetic interference. Actual encryption of simulated secure voice transmissions will not be required; however, tones and delays associated with the secure voice transmission/reception will be simulated. The effects of Electronic Countermeasures (ECM) and Electronic Counter Countermeasures (ECCM) are required. Aircrew personal helmets will be utilized (objective). Two-way live to virtual aircraft communication will be supported (objective).

(g) **Navigation**. Navigation systems must emulate those of the design basis aircraft. Digital map and radar terrain database representations must have resolution and update rates equivalent to the design basis aircraft. The AVCATT-A system must also simulate the interaction of the navigation systems with the weapon systems (e.g., target location store and prepoint). Navigation

systems must be accurately susceptible to jamming as appropriate to the design basis aircraft. The AVCATT-A system will also model the operation of the Embedded Global Inertial (EGI), Automatic Direction Finder (ADF), and associated air sensor systems. The capability to initiate loss of satellite signal and operate Global Positioning System (GPS) in a degraded mode must be provided.

(h) **Symbology Displays**. Flight symbology should replicate system specific flight symbology to a level sufficient to support collective/combined arms training and performance of the required collective tasks in Table 1.

(i) **Aircraft Survivability Equipment (ASE)**. ASE and appropriate cockpit visual and auditory cueing of warnings, cautions, and advisories and aircraft system linkages of each design basis aircraft represented in the AVCATT-A system must be provided. Interfaces to all battlefield SAF must be provided. The generation of ASE warnings must consider distance from the emitter, the effective range of the emitter, atmospheric conditions, line-of-sight, azimuth, and intervening terrain. The capability to employ countermeasures such as chaff and flares, radar jamming, and infrared jamming must be simulated to a level sufficient to support collective/combined arms training and performance of the required collective tasks in Table 1. The AVCATT-A system will include simulation of the operation of the Radar Warning Receiver (RWR), Laser Warning Receiver (LWR), Chaff/Flare Dispenser, Radar Jammer, Identification Friend or Foe (IFF), Missile Approach Detection, Infrared Jammer, and Radar Frequency Interferometer (RFI). ASE determined threat priority displays and associated voice messages must be simulated, correlated with the simulated real world environment, and represent the operational characteristics of the design basis aircraft ASE.

(j) **Vulnerability**. Manned simulators must emulate the effects of battle damage in accordance with the three categories of catastrophic kill, fire power/sensor kill, and mobility kill. Battle damage assessed to the manned simulators must correlate with the impacting round and the location of the impact. Battle damage feedback must be provided to the aircrew.

RATIONALE: AVCATT-A aircraft training devices must replicate all aircraft fielded to AC and RC aviation units worldwide, and must be of sufficient quantity to allow realistic company/troop level collective training. Appropriate levels of functionality and fidelity are required to ensure effective collective and combined arms training and the capability to perform all necessary collective tasks and supporting individual tasks.

(2) **Visual System**. The AVCATT-A system OTW and sensor visual realism must support realistic collective/combined arms training and performance of all required collective tasks in Table 1 **(KPP)**. The visual scene environment

will be seen through helmet mounted display (HMD) or OTW displays or both and sensors of all of the design basis aircraft. Specific characteristics required are:

(a) **Sensor Range**. Sensor graphic resolution will be comparable in detail and fidelity to the actual sensor system to the degree necessary to impart positive training and realism through the entire depth of the simulated battlefield.

(b) **Visual Range**. The OTW visual system must provide the crew with the detail, resolution, and fidelity necessary to impart positive training and provide accurate distance, velocity, and height estimation.

(c) **Field of View (FOV)**. The aircraft training devices must provide an OTW visual system with the horizontal and vertical ranges necessary to replicate each design basis aircraft and to allow crewmembers to perform the required collective tasks in Table 1.

(d) **Update Rates**. The visual system must support update rates equal to those of the design basis aircraft for symbology displays, sensor displays, and digital maps. OTW visual system update rates will provide smooth visual displays and will not show stepping, jitter, nor latency.

(e) **Environment**. The system must be capable of simulating dynamic time of day, night (to include manmade lights and moon illumination and angle), adverse weather (to include fog and clouds), selectable environmental conditions (temperature, wind, visibility, and ceiling), battlefield obscurants (to include smoke), white/brown-out conditions (caused by blowing snow, dust, or sand), and weapon flashes.

(f) **Battle Damage**. The visual system must be capable of displaying battle damage, to include catastrophic, to weapon systems, equipment, and cultural features such as roads, bridges, and runways to the degree comparable with CCTT.

(g) **Moving Models**. The visual system must provide sufficient visual, IR, and RCS models to portray moving and static tracked and wheeled vehicles, airborne vehicles, and threat air defense units. The digital data base will also include models of friend/foe troop and vehicular disposition.

(h) **Display**. The OTW visual system must have sufficient fidelity to support performance of the required collective tasks in Table 1. Sensor system displays must emulate the display characteristics of the design basis aircraft to a level sufficient to support positive training and provide accurate distance, velocity, and height estimation.

RATIONALE: Visual system realism is a critical component of the realistic, high intensity, task-loaded environment required to effectively train aviation aircrews.

AVCATT-A must have the visual system realism required to ensure effective collective and combined arms training and the capability to perform all necessary collective tasks and supporting individual tasks with no negative training transfer and no negative physical impacts on crewmembers due to visual system anomalies or limitations.

(3) **Semi-Automated Forces (SAF)**. The SAF must provide a realistic, tactically correct battlefield training environment; must provide an efficient, flexible, user friendly capability to build exercise scenarios and modify those scenarios real time; must be fair fight interoperable with the CCTT as the threshold and other SE Core compliant systems as the objective; must utilize OneSAF as the objective; and must interoperate with government developed geo-specific terrain data bases **(KPP)**.

(a) Battalion size friendly and regimental size opposing SAF must include the simulation of armor, infantry, artillery, air defense, engineer, aviation, Air Force, Navy, electronic warfare (EW), and any other weapon systems necessary to support collective/combined arms training and performance of the required collective tasks in Table 1.

(b) Friendly and opposing battlefield combatants must be doctrinally organized and deployed and capable of obeying current and emerging doctrinal rules of movement and engagement in offensive, defensive, and other roles. Appropriate SAF behavior stimulus/response is required.

(c) The SAF must provide a realistic, tactically correct battlefield training environment for the entire spectrum of war. SAF must represent appropriate weapon systems, command and control systems, tactics, and behaviors for friendly and opposing forces to a level to support collective/combined arms training and performance of the required collective tasks in Table 1. The capability to represent appropriate tactics and behaviors for civilian paramilitary forces, noncombatants, and vehicles must be provided (objective). The capability to provide a realistic, tactically correct battlefield training environment for military operations other than war must be provided (objective).

(d) The SAF must simulate friendly and opposing aerial and ground weapon systems in day, night, adverse weather, selectable environmental conditions (temperature, wind, visibility, and ceiling), battlefield obscurants (to include smoke), white/brown-out conditions (caused by blowing snow, dust, or sand), and weapon flashes. The SAF behaviors and capabilities must correlate to the visual system capabilities. This correlation must provide a fair fight environment between the manned simulators and the SAF. This fair fight environment requires the SAF to have the same behavioral characteristics, sensor acquisition, and weapon firing capabilities as the manned simulators.

(e) The SAF must be capable of performing all battlefield task supporting functions with limited operator intervention and, alternatively, must be controllable from unit level down to entity level by personnel who have been trained in their control and employment.

(f) The utilization of SAF must be transparent to the virtual forces participating.

(g) The SAF elements must be capable of moving as tethered, adjacent, forward, and rear entities or elements with manned simulators. The SAF must have behaviors to support direct coordination of collective task execution with the manned simulators. The SAF must provide an emulation of the Command, Control, Communication, Computers, and Information (C4I) systems required to coordinate activities with the manned simulators.

(h) The SAF system must provide an efficient, flexible, user friendly capability to build exercise scenarios and modify those scenarios real time. It must provide the capability to create or modify force structure, doctrine, weapon system parameters, composition, routes of travel, speed, actions, and level of lethality for both friendly and opposing forces. A digital data transfer capability from the Aviation Mission Planning System (AMPS) to the SAF is required (objective).

(i) The SAF friendly and opposing weapon systems must use appropriate RCS and IR signatures. Signatures and SAF capability to detect and engage targets must be capable of being affected by atmospheric conditions.

(j) The SAF threat emitters must provide appropriate signals.

(k) The SAF must emulate the effects of battle damage on the characteristics and capabilities of the actual weapon systems and equipment impacted. Vulnerability of SAF weapon systems and equipment to battle damage must correlate with the impacting round and the location of the impact. Emulation of catastrophic battle damage resulting in the disabling of weapon systems, equipment, and command and control systems is required. Battle damage to cultural features such as buildings, engineering obstacles, roads, bridges, and runways is required and must affect SAF mobility and visibility.

(l) The AVCATT-A system must provide the capability to implement an exercise scenario within six hours. Implementation is defined as taking a defined training requirement from the user (e.g., training objectives, graphics, red and blue order of battle, missions, tactical communications plan, etc.), developing the associated scenario data, building the scenario in the system (data input), and initializing the scenario/training exercise.

(m) The capability to vary lethality of SAF to match increasing proficiency must be provided.

RATIONALE: The accurate replication of friendly and opposing forces is a critical component of the realistic, high intensity, task-loaded environment required to effectively train aviation units to fight and survive on the joint/combined arms battlefield. The SAF provides the capability to build the battlefield around the manned simulators by generating the weapon systems, command and control systems, tactics, and behaviors for friendly, opposing, and civilian paramilitary forces and non-combatants. To accurately portray the battlefield, it must include all of the joint task force/combined arms elements and aviation support systems for all types of operations in all types of environmental conditions. It must also accurately simulate weapon system and equipment vulnerability and battle damage, to include catastrophic. Controllability of the SAF from no operator intervention to operator control down to the entity level is required to support variable unit training requirements and flexible training scenario development. To allow realistic, appropriate, and coordinated tactics and behaviors, friendly SAF must be indistinguishable from and capable of moving as adjacent, forward, and rear elements with manned simulators. To ensure appropriate warning signals and displays are provided to the manned simulators, SAF threat emitter signals and the ASE within the manned simulators must be closely correlated. To ensure interoperability with other simulation systems, the AVCATT-A must be fair fight interoperable with CCTT as the threshold and other SE Core compliant systems as the objective, must utilize OneSAF as the objective, and must interoperate with government developed geo-specific terrain data bases. Because SAF force structure, doctrine, and weapon system capabilities and characteristics are highly dynamic, the accuracy and realism of the SAF are critical to training effectiveness, and to ensure responsiveness to unit training requirements, the AVCATT-A SAF must be easily modifiable in a timely manner.

(4) **Command, Control, Communication, Computers, and Information (C4I)**.

(a) The AVCATT-A system must have the capability to interface with current C4I systems (i.e., Army Battle Command Systems (ABCS)) **(KPP)**.

(b) The AVCATT-A voice radio communication system must have the capability for 32 radio nets.

(c) The AVCATT-A voice radio communication system must interface with simulated voice radio communication systems in tactical operations centers (TOC) (threshold) and must interface with actual voice radio systems (objective). The capability to provide a simulated voice radio communication system for up to eight positions in a live TOC must be provided. Each position must have the capability to transmit and receive on all nets, four selectable simultaneously.

(d) Role player workstations must be provided to monitor and interact with the simulation exercises. At least four multi-functional workstations are required, each capable of operating as one of the following functional areas: ground maneuver, FS, CAS, logistics, battle command, and engineer. A radio communication system will be provided for each of these workstations with the capability to transmit and receive on all nets, four selectable simultaneously.

(e) AMPS capability must be provided to simulate the planning and data transfer functionality of the fielded AMPS and the design basis aircraft.

RATIONALE: The capability to interface with actual C4I systems is critical to providing effective collective/combined arms training for company/troop through brigade commanders and staff personnel. To ensure total unit training, AVCATT-A must be able to interface with actual C4I systems, include simulation role player workstations, and include planning and data transfer capabilities.

(5) **Battlemaster Control (BMC) Console**.

(a) A BMC console must be provided to initialize and control collective/combined arms training exercises, monitor system operation, and control network gateways.

(b) The BMC console must include a radio communication system with the capability to transmit and receive on all nets and monitor ICS, five selectable simultaneously.

(b) The capability to control aircraft location, configuration, and environment; training exercise parameters; and degraded mode operations at initialization and during the exercise must be provided.

(c) The BMC console must have the capability to initialize and control a follow-on exercise while the after action review (AAR) is in session for the previous exercise.

RATIONALE: The BMC console is required for exercise control. The capability to initialize and control a follow-on exercise while the AAR is in session for the previous exercise is required to support multiple unit training requirements and ensure maximum utilization and training effectiveness of the AVCATT-A system.

(6) **After Action Review (AAR)**.

(a) The AVCATT-A system must include an AAR capability for real time viewing and after action debriefing as well as the capability to monitor, record, and play back various time stamped key events that take place during a training session (KPP). The system will record unit movement, weapons

engagements, hits, kills, ammunition expended, communications conversations to include radio and ICS, and combat support and combat service support operations in video and data printout forms during the conduct of training. The system will have the capability to provide exercise statistics in a graphical representation format.

(b) The recorded data must be time stamped and the operator must be able to tag specific events to allow the observer/controller or commander to stop at significant points during playback to highlight important principles.

(c) A theater viewing area must be provided that is large enough to accommodate 20 personnel.

(d) A stealth eyepoint controlled by the AAR operator must be provided that can be flown anywhere within the exercise battlespace or attached to any aircraft or SAF entity. The system must provide the capability to observe and monitor the OTW and sensor visual displays and the radio and intercom system (ICS) audio transmissions of a selected aircraft training device. The system must provide a horizontal view of the simulated terrain from any selectable perspective and elevation.

(e) The record/playback capability must provide the following functionality: playback speeds from 50 percent of real time to 1000 percent of real time, the capability to freeze an exercise at any time, the capability to start/restart from any selected freeze time of a previously recorded or on-going exercise, the capability to re-enter a training scenario, and the capability to fly out at any point in a playback sequence. Record/playback capability must be provided for OTW stealth; plan view display (PVD); voice radio, voice ICS, and digital communications; and aircraft sensor views as a minimum. All exercise information must be data logged with time stamp. The record/playback capability must be able to record and play back simultaneously.

(f) The AAR must have a PVD capability consisting of Military Grid Reference System (MGRS) and latitude/longitude maps of any selected ground segment of the battlefield. The system must be capable of superimposing icons and operations overlays onto the display at the same scale as was used in its creation. The capability to increase or decrease the scale must also be provided.

(g) The AAR system must be capable of electronically downloading pertinent performance and utilization data which will be used by the Aviation Branch to conduct continuation assessment of validity, concurrency, and life-cycle training effectiveness. Pertinent performance and utilization data should include but not be limited to unit movement, weapons engagement, hits, kills, ammunition expended, communications conversations, combat support and combat service support operations, and cost analysis for weapons and flight hours.

(h) A radio communication system must be provided at the AAR console and must be capable of monitoring all radio nets and the ICS, five selectable simultaneously.

(i) The AVCATT-A AAR system will comply with the Standard Army After Action Review System (STAARS) requirements when implemented (objective).

RATIONALE: An AAR capability must be provided which effectively supports the conduct and evaluation of collective/combined arms training and fully exploits the potential of computer generated simulation. The real time viewing (stealth/OTW/sensor/PVD displays), after action debriefing (record/playback), statistical presentation, data logging/time stamp/tag, monitoring of audio transmissions, and data downloading capabilities directly support AAR effectiveness by giving instructors, commanders, and OCs the capability to highlight and discuss in detail critical events/actions in the exercise, to illustrate alternative actions and outcomes, and to allow the unit to reenter the exercise at critical points to try alternative actions. The theater viewing area must be large enough to accommodate commanders, staff personnel, OCs, aircrew members, role players, and exercise control personnel as necessary. Compliance with STAARS is required to support interoperability with other simulation systems in the future.

(7) **Environment**.

(a) The system must be capable of simulating dynamic time of day, night (to include manmade lights and moon illumination and angle), adverse weather (to include fog and clouds), selectable environmental conditions (temperature, wind, visibility, and ceiling), battlefield obscurants (to include smoke), white/brown-out conditions (caused by blowing snow, dust, or sand), and weapon flashes.

(b) The simulated environment must include terrain of sufficient fidelity to support collective/combined arms training and performance of the required collective tasks in Table 1. Six geo-specific terrain data bases must be provided: National Training Center (NTC) (Fort Irwin), Combat Maneuver Training Center (CMTC) (Grafenfels), and Fort Hood (threshold), and Joint Readiness Training Center (JRTC) (Fort Polk), Bosnia, and Korea (objective). Terrain representations must provide for urban and ocean areas, as appropriate. Climatic environments must correlate with the terrain data bases, as appropriate. The scene content and population of the terrain data bases must meet training, mission, and area of operation requirements. The deliverable data bases must be of sufficient size to conduct collective/combined arms training and performance of the required collective tasks in Table 1. Sufficient size is defined as 100KM x 150KM (threshold) and a minimum of 180KM x 180KM with

expansion capability to SE Core terrain data bases (objective). The AVCATT-A terrain data bases must correlate with the terrain data bases of CCTT as the threshold and other SE Core compliant systems as the objective. Terrain data bases must be developed using the National Imagery and Mapping Agency (NIMA) source data. The AVCATT-A system must be capable of utilizing government developed geo-specific terrain data bases. To support mission rehearsal, the interfaces through which the terrain data bases are integrated into the simulation must accommodate high fidelity geo-specific terrain data bases and rapidly configured terrain data bases developed based on standard digital topographic data products from the NIMA (objective).

(c) The training of Nuclear, Biological, and Chemical (NBC) effects such as weapon detonations and ElectroMagnetic Pulse (EMP) is required (objective).

RATIONALE: AVCATT-A must simulate the battlefield environments in which attack, reconnaissance, cargo, and utility aircraft are expected to operate. Simulation of environmental conditions and geo-specific terrain data bases with terrain of sufficient fidelity are critical components required to ensure realistic, effective training of collective tasks, supporting individual tasks, command and control, and mission planning. Tactics, weapon systems, aircraft capabilities and controllability, fuel and ammunition planning, sensors, and communications are impacted by environmental conditions and terrain; therefore, AVCATT-A must provide the capability for units to conduct training under battlefield conditions to ensure they are prepared to fight and survive on the joint/combined arms battlefield. AVCATT-A terrain data bases must correlate with the terrain data bases of CCTT as the threshold and other SE Core compliant systems as the objective to ensure interoperability. AVCATT-A interfaces through which the terrain data bases are integrated into the simulation must accommodate high fidelity geo-specific and rapidly configured terrain data bases to ensure the capability to support mission rehearsal. Simulation of NBC effects is required to ensure individual, crew, and unit preparedness for the possibility of NBC conflict.

(8) **Networkability and Interoperability**. The AVCATT-A system must interoperate with other simulation systems through LAN and WAN utilizing broadcast and multicast modes, must be JTA-A compliant, must be SE Core compliant, and must achieve fair fight interoperability with CCTT as the threshold and other SE Core compliant systems as the objective **(KPP)**.

RATIONALE: AVCATT-A must interoperate with other simulation systems, be JTA-A compliant, be SE Core compliant, and achieve fair fight interoperability with CCTT as the threshold and other SE Core compliant systems as the objective to ensure the capability for AVCATT-A to network with other simulation systems in joint/combined arms simulation exercises.

(9) **Software**. Software assets developed specifically for and delivered with the AVCATT-A system must be government owned, candidates for government reuse libraries, and unrestricted for use in other government contracts. The software and configuration management must come fully documented.

RATIONALE: To minimize software development and life cycle costs and maximize software quality, AVCATT-A software assets must be government owned, candidates for government reuse libraries, unrestricted for use in other government contracts, and fully documented.

(10) The AVCATT-A system must be capable of completing 92 percent of the tactical training exercises without a system abort (termination or inability to start training exercise).

RATIONALE: System operation within this threshold is expected to allow necessary training levels to be met. Performance below a 92 percent exercise completion percentage could impact training schedules to where some units may not receive the necessary training.

(11) **Mean Time to Repair (MTTR)**. The MTTR for the AVCATT-A system must not exceed 1.0 hour.

RATIONALE: An MTTR of more than 1.0 hour will adversely affect the ability to return the equipment to operation in order to fulfill additional training exercise requirements.

b. **Logistics and Readiness**.

(1) The AVCATT-A system must be capable of training 11 hours per day, 5 days per week.

(2) The time required to initialize a pre-built scenario and change configuration of the aircraft training devices will not exceed 90 minutes. The time required to initialize a pre-built scenario without changing configuration of the aircraft training devices will not exceed 30 minutes.

(3) **Life Cycle Contractor Support (LCCS)**. LCCS is required for the AVCATT-A system at all fielded locations. Contractor logistics support will provide operations and technical maintenance system support of the AVCATT-A hardware and software. A system for post deployment software support (PDSS) will be required.

c. **Other System Characteristics**.

(1) **Operational Environment**.

(a) The AVCATT-A must be a mobile, transportable, trailerized system **(KPP)**.

(b) All elements of the AVCATT-A system must meet applicable Occupational Safety and Health Act (OSHA), Environmental Protection Agency (EPA), and Army standards for safe equipment usage. Noise levels must be compliant with the criteria specified in MIL-STD-1472 and MIL-STD-1474 for personnel protection and to allow verbal instruction during training device operation.

(c) The AVCATT-A system will be designed for modular transportability aboard ship or in other temporary facilities to support training exercises or mission rehearsals while in transit or in temporary facilities (objective).

(d) The AVCATT-A system will utilize a locally provided power source, but must provide for conditioned power. In the event of a commercial power failure, AVCATT-A must provide emergency lighting, must have the capability to shut down without damage to hardware and software, and must have the capability to restart at the point of shutdown with no loss of data.

(e) **Maintenance Diagnostic Capability**. A maintenance diagnostic capability is required to monitor system operation and diagnostics and support maintenance of the AVCATT-A system. This capability should be segregated from the BMC console.

(2) **Security**. AVCATT-A will accommodate an operational mode for the UNCLASSIFIED level of security classification. The software data structures will accommodate the future use of classified data.

5. **PROGRAM SUPPORT**.

a. **Maintenance Planning**. The AVCATT-A system integrated logistics support (ILS) must include provisions for a cost effective life cycle support plan, operations support, site management, equipment support/maintenance, logistics, and transportation.

b. **Support Equipment**.

(1) The AVCATT-A system will be maintained by standard test equipment and include self-test diagnostics for fault isolation capabilities to diagnose failures to a level commensurate with meeting the MTTR.

(2) All hardware and software support tools must be supplied with the AVCATT-A system.

(3) All hardware and maintenance support documentation, technical manuals, engineering drawings, and passwords must be provided.

c. **Human Systems Integration/MANPRINT**.

(1) **Manpower/Force Structure**. The aircraft simulators will be operated by military personnel in military occupational specialties (MOS) found in the training unit. All personnel utilizing the AVCATT-A system must meet all requirements necessary for performing their MOS or area of concentration (AOC). The AVCATT-A system will not increase force structure requirements for operations and maintenance.

(2) **Personnel Assessment**. There are no concerns for personnel utilizing the AVCATT-A system.

(3) **Training Assessment**. Two multimedia training support packages (TSP), to include digitized guides and manuals, must be developed. The multimedia TSPs will include tutorial "how to" modules that permit audiences to be self-taught, where feasible, and include a diagnostic module that permits identification of operator/user procedural errors. Training must be developed in accordance with the Systems Approach to Training (SAT) process, developed utilizing the Automated Systems Approach to Training (ASAT), and validated and approved by the government prior to site delivery.

(a) The purpose of the first TSP is to provide AVCATT-A system familiarization training for users. It will include, but not be limited to:

- familiarization with the AVCATT-A system components, capabilities, training concept, and safety precautions.

- familiarization with the training exercise preparation and execution process. An advance preparation package must be developed and provided to each unit prior to their training period to assist them in planning exercise scenarios, developing exercise parameters, and determining training material requirements.

- familiarization with the AAR, record/playback, and instructional capabilities for commanders, staff personnel, instructor pilots, and observer controllers.

- operator training for the role player workstations and the radio communication system.

- aircrew training for the aircraft training devices to include familiarization with sensor and OTW visual system displays, operating instructions, instructional

capabilities, simulation/simulator anomalies, terrain data base considerations, friendly and opposing entity recognition, and communication systems.

(b) The purpose of the second TSP is to provide training for the battlemaster and AAR operator and should include all tasks required to conduct system familiarization training, to develop and execute training exercise scenarios, to conduct an AAR, and to perform the administrative functions required for site management.

(c) At least one instructor and key personnel training (IKPT) course which includes both TSPs must be included in the system acceptance plan and provided to the government prior to each system acceptance and/or site delivery.

(d) Institutional training in the AVCATT-A system will be planned, conducted, and evaluated by institutional instructors. Unit training in the AVCATT-A system will be planned, conducted, and evaluated by the unit being trained. Training time will be scheduled by the controlling installation.

(4) **Human Engineering (HE)**. The AVCATT-A system operation must be user friendly to the extent that scheduled training of the target audience can be accomplished in accordance with the training listed in 5.c.(3) above. The AVCATT-A system must provide accurate representation of the work space in each of aircraft training devices and adequate work space in the BMC, AAR, SAF, and role player workstation areas. The BMC, AAR, SAF, and role player workstation layouts must be designed to be effectively utilized by personnel in the 5 percentile female to 95 percentile male anthropometric range. HE design criteria must be incorporated into the AVCATT-A system design to ensure human and system performances are optimized. The AVCATT-A system design must consider human requirements for workspace layout, controls and displays, lighting, heating, cooling, ventilation, vibration, shock, noise, and safety to ensure the human element does not degrade system performance.

(5) **Safety**.

(a) All identified safety hazards associated with the operation, maintenance, or support activities of the AVCATT-A system will be eliminated or reduced to the lowest acceptable risk level to the government. Precautions normally taken with the use of electrical components, computer equipment, and video screens should be observed.

(b) The AVCATT-A system must not emit harmful levels of radiation. All electrical connections must be constructed to prevent the possibility of electrical shock to users/operators. Personnel must be able to enter and exit the simulator work areas safely.

(c) System safety risk assessments (SSRA) must be prepared on all known residual high and medium risk safety and health hazards to identify their resultant risk and to ensure their elimination or reduction to acceptable risk levels with acceptance/approval by the appropriate decision authority.

(d) Health hazards which may be associated with mechanical forces or pressures, toxic substances, ionizing or non-ionizing radiation, noise, or other emissions from the AVCATT-A system, either in its operation, maintenance, or support activities, must be identified and eliminated or reduced to acceptable levels as prescribed by appropriate government standards (including U.S. Army aeromedical standards).

d. **Computer Resources**.

(1) The AVCATT-A system must interoperate with other simulation systems through LAN and WAN utilizing broadcast and multicast modes, must be JTA-A compliant, must be SE Core compliant, and must achieve fair fight interoperability with CCTT as the threshold and other SE Core compliant systems as the objective.

(2) The AVCATT-A system will allow for modular upgrades of equipment and software as technology evolves and as doctrine and tactics change.

e. **Other Logistics Considerations**. The AVCATT-A system must be colocated with other CATT facilities (CCTT, Engineer CATT (ENCATT), Air Defense CATT (ADCATT), and Fire Support CATT (FSCATT)) where feasible to minimize operating costs.

f. **Command, Control, Communication, Computers, and Information (C4I)**. See paragraph 4.a.(4) above.

g. **Transportation and Basing**.

(1) The AVCATT-A system must be transportable and trailerized such that :

(a) The AVCATT-A system modularity design must support preparation of the AVCATT-A system for transfer within eight hours.

(b) The AVCATT-A system must be operational within eight hours after delivery.

(2) The AVCATT-A system must be transportable along improved roads within and outside the Continental United States (CONUS) and by military aircraft (C5 threshold, C-17 objective) and surface ship.

h. **Standardization, Interoperability, and Commonality**.

(1) The AVCATT-A system design must consider standardization, commonality of hardware and software, and interoperability within the following:

(a) The AVCATT-A system must interoperate with other simulation systems through LAN and WAN utilizing broadcast and multicast modes, must be JTA-A compliant, must be SE Core compliant, and must achieve fair fight interoperability with CCTT as the threshold and other SE Core compliant systems as the objective.

(b) The AVCATT-A system logistic, training, and administrative support commonality with the CCTT must be maximized.

(c) The AVCATT-A system must utilize reconfigurable technology.

(2) A verification and validation (V&V) process must be conducted for all SAF and manned simulators. A V&V plan must be developed, approved by the government, and incorporated into the testing schedule. As a minimum, all weapons tables, rotor models, threat models, ASE models, and specific aircraft performance characteristics must be addressed. This V&V must be progressive and continuous and must include government oversight at pre-determined critical points during development.

i. **Mapping, Charting, and Geodesy Support**. Maps of terrain data bases must be provided in accordance with paragraph 4.a(7)(b).

j. **Environmental Support**. The AVCATT-A system requires an environmentally controlled container.

6. **FORCE STRUCTURE**. The AVCATT-A force structure representation is based on unit collective/combined arms training requirements for both the AC and RC units worldwide. The projected basis of issue plan (BOIP) quantitative requirements are 18 reconfigurable AVCATT-A suites (12 AC and 6 RC). As the Army moves into the 21st Century and evolves to Force XXI and Army After Next (AAN) organizations, the need may arise to purchase additional systems to meet new training needs for both army and joint forces.

7. **SCHEDULE CONSIDERATIONS**. First unit equipped (FUE) is achieved when the first installation is in possession of a complete AVCATT-A suite, including all manuals and associated support equipment, and a complete LCCS package is in place. Initial operational capability (IOC) is achieved when the FUE installation can successfully conduct collective/combined arms training in accordance with the capabilities described in paragraph 4. IOC for AVCATT-A Suite #1 is required 15 months after contract award (objective) and 21 months after contract award (threshold). IOC for AVCATT-A Suite #2 is required 15

months after exercise of contract option (objective) and 21 months after exercise of contract option (threshold).

GLOSSARY

Section 1 Definitions

Emulate: approaching equivalency.

Replicate: identical.

Simulate: varying degrees of replication.

Interoperability: ability of a model or simulation to provide services to, and accept services from, other models and simulations and to use the services so exchanged to enable them to operate effectively together.

Fair Fight: two or more simulations may be considered to be in a fair fight when differences in the simulations' performance characteristics have significantly less effect on the outcome of the conflict than actions taken by the simulation participants.

Section 2 Acronyms

A2C2	Army Airspace Command and Control
AAN	Army After Next
AAR	After Action Review
ABCS	Army Battle Command System
ABF	Attack by Fire
AC	Active Component
ADA	Air Defense Artillery
ADCATT	Air Defense Combined Arms Tactical Trainer
ADF	Automatic Direction Finder
AMPS	Aviation Mission Planning System

AOC	Area of Concentration
APU	Auxiliary Power Unit
ARMS	Aviation Reconfigurable Manned Simulator
ASAT	Automated Systems Approach to Training
ASE	Aircraft Survivability Equipment
AVCATT-A	Aviation Combined Arms Tactical Trainer-Aviation Reconfigurable Manned Simulator
BMC	Battlemaster Control
BOIP	Basis of Issue Plan
BOS	Battlefield Operating System
C4I	Command, Control, Communication, Computers, and Information
CAS	Close Air Support
CATS	Combined Arms Training Strategy
CATT	Combined Arms Tactical Trainer
CCTT	Close Combat Tactical Trainer
CMTC	Combat Maneuver Training Center
CONUS	Continental United States
DIS	Distributed Interactive Simulation
ECM	Electronic Countermeasures
ECCM	Electronic Counter Countermeasures
EGI	Embedded Global Inertial
EMP	Electromagnetic Pulse
ENCATT	Engineer Combined Arms Tactical Trainer

EPA	Environmental Protection Agency
EW	Electronic Warfare
FCR	Fire Control Radar
FOV	Field of View
FS	Fire Support
FSCATT	Fire Support Combined Arms Tactical Trainer
FUE	First Unit Equipped
GPS	Global Positioning System
GTM	Ground Targeting Mode
HE	Human Engineering
HIDSS	Helmet Integrated Display/Sight Subsystem
HLA	High Level Architecture
HMD	Helmet Mounted Display
HUD	Heads Up Display
I	Improved (OH-58D)
I2	Image Intensification
IO	Improved Optimized (OH-58D)
ICH	Improved Cargo Helicopter
ICS	Intercom System
IFF	Identification Friend or Foe
IHADSS	Integrated Helmet and Display Sight System
IKPT	Instructor and Key Personnel Training
ILS	Integrated Logistics Support

IOC	Initial Operational Capability
IR	Infrared
JAAT	Joint Air Attack Team
JRTC	Joint Readiness Training Center
JTA-A	Joint Technical Architecture-Army
LAN	Local Area Network
LCCS	Life Cycle Contractor Support
LRFD	Laser Range Finder/Designator
LUH	Light Utility Helicopter
LWR	Laser Warning Receiver
MC	Maintenance Console
METL	Mission Essential Task List
MGRS	Military Grid Reference System
MOS	Military Occupational Specialty
MTTR	Mean Time to Repair
NBC	Nuclear, Biological, and Chemical
NIMA	National Imagery and Mapping Agency
NOE	Nap-of-the-Earth
NTC	National Training Center
NVG	Night Vision Goggles
ODA	Optical Display Assembly
OPFOR	Opposing Force
OPSEC	Operations Security

OSHA	Occupational Safety and Health Act
OTW	Out-the-Window
PDSS	Post Deployment Software Support
PNVS	Pilot Night Vision System
PVD	Plan View Display
R	Digitized (OH-58D)
RAM	Reliability, Availability, and Maintainability
RC	Reserve Component
RCS	Radar Cross Section
RFI	Radar Frequency Interferometer
RMAP	Radar Map
RWR	Radar Warning Receiver
SAF	Semi-Automated Forces
SAT	Systems Approach to Training
SBF	Support by Fire
SE	Synthetic Environment
SSRA	System Safety Risk Assessments
STAARS	Standard Army After Action Review System
TADS	Target Acquisition and Designation Sight
TAS	Target Acquisition Systems
TOC	Tactical Operations Center
TPM	Terrain Profiles Mode
TSP	Training Support Package

UPS	Uninterruptible Power Supply
V&V	Verification and Validation
WAN	Wide Area Network